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Controlling Lungworms of Swine

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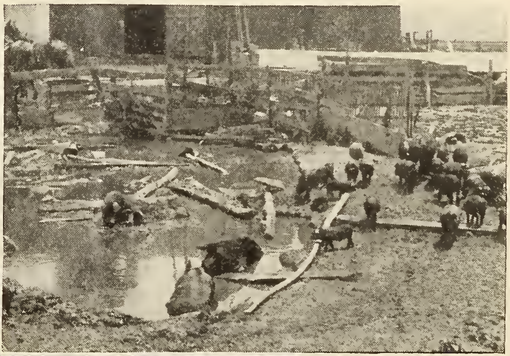

Conditions favoring lungworm infestations.

Conditions which prevent lungworm development.

U.S. Department of Agriculture

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CONTROLLING LUNGWORMS OF SWINE

By Benjamin Schwartz, *chief, Zoological Division, Bureau of Animal Industry*

Lungworms are among the most injurious parasites occurring in swine. When present in large numbers, these worms cause general unthriftiness in pigs, which results in considerable economic loss. Affected young pigs, especially, may develop pneumonia, with fatal consequences. So far as is known, lungworms cannot be removed by medicinal treatment or in any other way. The only known way to control infestations of these parasites is by proper sanitary procedure.

Appearance and Effect of Lungworms

Lungworms are whitish, threadlike roundworms, from about ½ inch to 2 inches in length, and from about $\frac{1}{25}$ to about $\frac{1}{12}$ of an inch in width. These parasites occur occasionally in the windpipe but usually in its two main branches, known as the primary bronchi; in the ramifications of these bronchi; and in the finer terminal branches of these ramifications, known as the bronchioles (fig. 1). In these locations lungworms are often present in numbers sufficient to plug the smaller bronchi and bronchioles and interfere with normal breathing. When lungworms accumulate in large numbers, usually in the finer bronchi and bronchioles along the lower borders of the lungs, they produce a localized pneumonia. The lungs take on a mottled appearance, the mottling being due to grayish pneumonic areas adjacent to whitish areas which have become permanently distended with air. Although older pigs can and usually do survive a condition of this sort without much evident discomfort, young pigs may be seriously affected by lungworm infestation and may die as a result of it.

Lungworm infestation in pigs is characterized by a cough, especially in the early stages. This is due to irritation of the delicate lining of the windpipe and its branches produced by the arrival of the wandering worms in the lungs and their subsequent migration there. In addition, lungworms contribute their share to unthriftiness in the animal, a condition associated with parasitic infestation.

Eggs Expelled with Droppings

Pigs that are moderately or heavily infested with lungworms discharge incredibly large numbers of eggs with their droppings, especially during the period of infestation when the reproductive capacities of the parasites are high. The eggs can be seen only with the aid of a microscope. In experimental infections insufficient to produce very marked symptoms in pigs, it was estimated that as many as 3 million eggs were eliminated in the droppings of one pig during a period of only 24 hours. This estimate by the writer and an associate was based on careful counts of the number of eggs present in a definite quantity of feces.

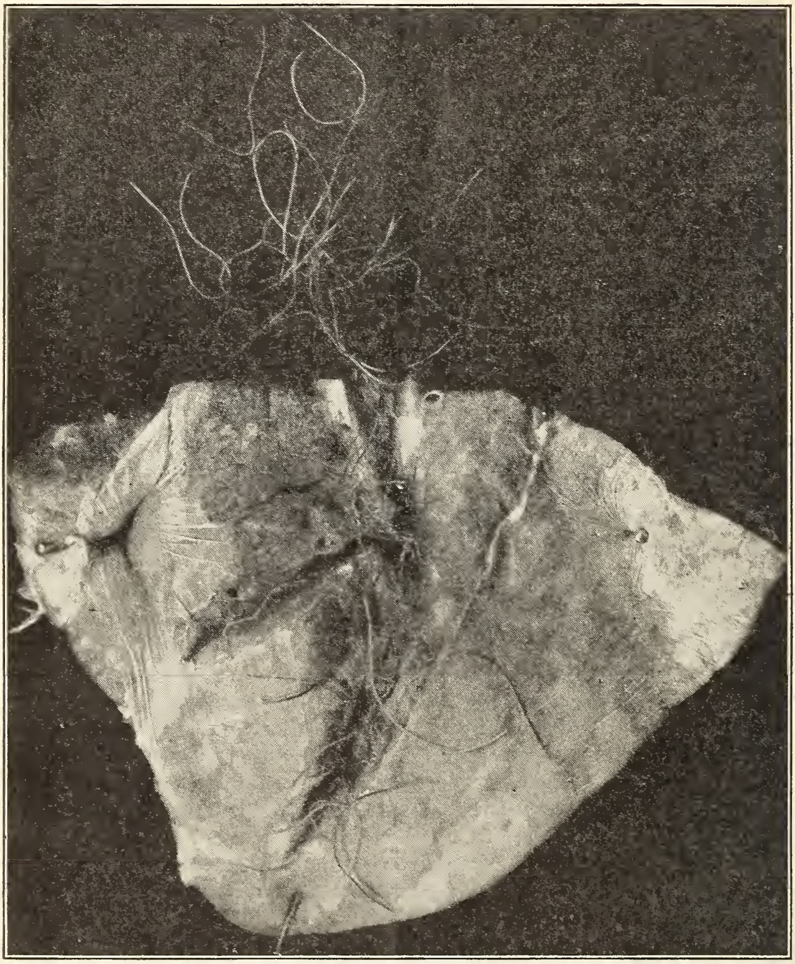

FIGURE 1.—Lower portion of a swine lung, partially cut open to show the nests of lungworms. In order to show their size and appearance, some of the worms were removed from the lung. (About natural size.)

The eggs, like any other small foreign bodies, are expelled from the lung of affected pigs through the action of cilia (minute whiplike projections) that protrude from the cells lining the windpipe and its branches. The eggs are moved upward in the lungs by the action of these cilia; in this way they reach the pharynx (back of the mouth) and are then swallowed. The hard shells resist the action of the digestive fluids as the eggs move down the stomach and intestine. They are finally expelled from the intestine with the feces.

Lungworm Eggs Swallowed by Earthworms

Each normal egg expelled with the feces of infested swine contains a larva (young worm) moving within the shell rather sluggishly. The movements do not rupture the shell, as happens in the case of thin-shelled eggs of other parasitic roundworms. The hatching of the swine lungworm eggs and the further development of the parasite take place in the bodies of earthworms, or angleworms, which swallow the feces containing these eggs.

Earthworms usually abound in hog lots and in permanent pastures in which manure accumulates. They feed and thrive in the dung of all kinds of animals and swallow lungworm eggs which are present in swine feces infested with these eggs. The writer and others have found that earthworms collected in old hog lots and on permanent, ill-kept pastures showed a high rate of infestation with lungworm larvae in various stages of development. More than 2,000 larvae have been obtained from a single earthworm collected in a hog lot in one of the Southern States. The larvae are present in the blood system and in the wall of the upper portion of the gut of earthworms. They remain alive in earthworms for months and are found in them at all seasons of the year.

Pigs Infested by Earthworms

Susceptible swine can become infested with lungworms at any time, provided they have access to infested earthworms. Because of their rooting habits, pigs bring earthworms to the surface. As is well known, pigs eat earthworms, which constitute, apparently, a choice morsel in their diet. The swallowing of even a single heavily infested earthworm is likely to produce a marked infestation with lungworms in a young pig.

Considering the high reproductive powers and the life history of these parasites, as already described and as shown in figure 2, it is not surprising that lungworm infestation in swine is difficult to control under ordinary methods of swine management.

The lungworm larvae present in earthworms are liberated in the pig's stomach and intestine by the process of digestion, and the tiny worms, once they are free in the intestine, bore into the delicate lining of the intestinal wall, move along with the lymph stream, get into the blood, and are carried to the lungs. Here they leave the delicate blood vessels, enter the air spaces of the lungs, and move up into the ramifying branches of the air-tube system of the lungs, where they settle down and develop to fertile maturity in about 4 weeks. Mature female lungworms produce eggs for varying periods, usually a number of months. However, they produce most of the eggs during the first 3 or 4 months of the fertile period.

Growing Pigs More Susceptible Than Older Stock

Infested young pigs that are being raised for market discharge more eggs than infested older breeding stock. As pigs grow older they tend to become resistant to new infestations. Furthermore, lungworms which pigs acquired early in life and which have not yet been eliminated from the lungs or otherwise disposed of, slow down in egg production. If pigs are protected from lungworm infestation until they are 6 months old, they are still highly susceptible to these parasites and develop heavy infestations if they have access to infested earthworms. Older pigs are fairly resistant to lungworms, as a rule, only because of a previous infestation from which they have recovered. The protection of young pigs from infestation with lungworms is, therefore, an important sanitary measure not only because such protection prevents damage to the vital organs of growing pigs, but also because it checks the pollution of pastures with millions of lungworm eggs.

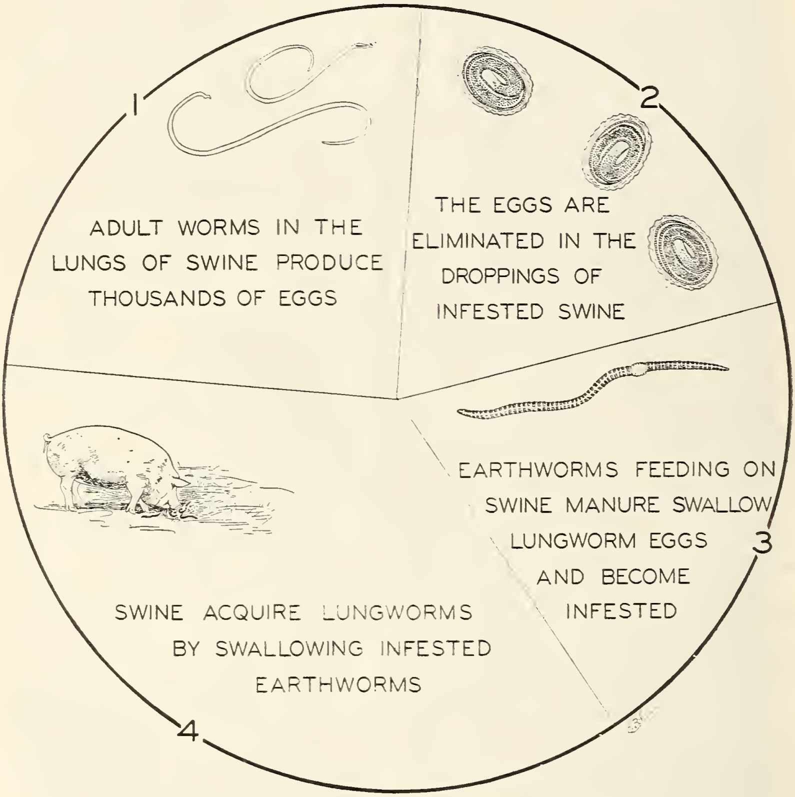
1
ADULT WORMS IN THE LUNGS OF SWINE PRODUCE THOUSANDS OF EGGS
2
THE EGGS ARE ELIMINATED IN THE DROPPINGS OF INFESTED SWINE
3
EARTHWORMS FEEDING ON SWINE MANURE SWALLOW LUNGWORM EGGS AND BECOME INFESTED
4
SWINE ACQUIRE LUNGWORMS BY SWALLOWING INFESTED EARTHWORMS

FIGURE 2.—Life history of the swine lungworm.

Prevention

Any measures which prevent rooting by pigs will lessen lungworm infestation. Ringing the noses of pigs controls to some extent not only lungworms but also thorny-headed worms, the latter parasites being acquired by pigs as a result of eating May beetle larvae brought to the surface by rooting. Adequate rations tend to keep pigs from hunting for feed among litter and trash of all sorts under or in which earthworms are likely to take shelter. Keeping pastures free from boards, logs and boxes, or other accumulations is a further step in controlling lungworms.

Pigs raised on permanent pastures are usually heavily infested with lungworms and other worms. The humus and manure on permanent pastures favor the persistence and abundance of the earthworms and provide favorable conditions for the survival of the eggs and larvae of various other parasites that infest swine.

Temporary pastures, on the other hand, harbor comparatively few earthworms. This may be due, in part, to the repeated plowing to which temporary pastures are subjected. Pigs raised on temporary pastures surrounded by good fences have been found to be free or nearly free of lungworm infestation and but lightly infested with other parasites. Figure 3 shows three litters of pigs that were raised on temporary pastures to facilitate parasite control.

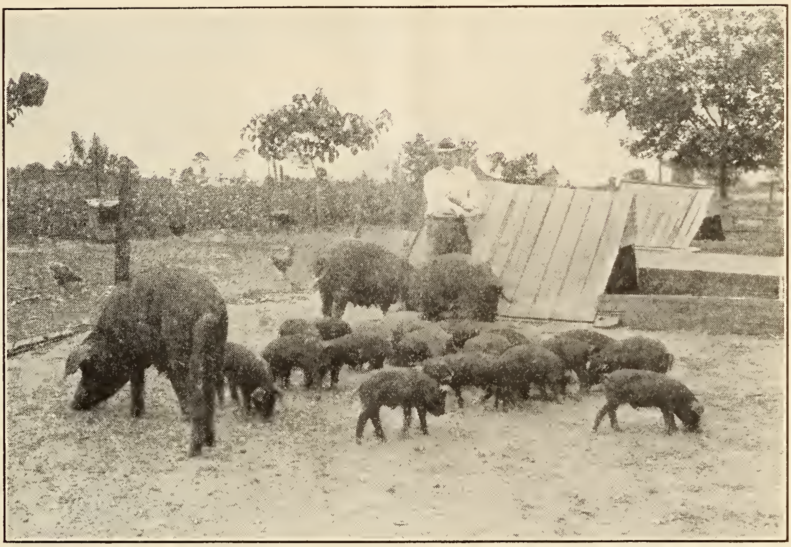

FIGURE 3.—Sows and their 7-week-old litters raised on temporary pastures to facilitate the control of lungworms and other parasites. Note thriftiness and uniform size of pigs.

Bare, permanent hog lots with their accumulations of trash and litter provide ideal breeding places for earthworms, and such lots are centers of lungworm infestation. Ill-kept barns with dirt floors also offer a haven to earthworms, as do also wet places which unconfined pigs usually frequent if they have access to them.

In short, the use of clean, well-fenced, temporary pastures having good drainage offers a simple and effective control measure for lungworms. As long as pigs are confined on such pastures and prevented from getting into low, damp areas not under cultivation and on other areas likely to harbor earthworms, lungworms of swine can be controlled to a point where they do comparatively little harm.

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